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ANTI BACTERICIDAL EFFECT OF THE EXTRACT OF JIMSON WEEDS *(DATURA STRAMONIUM)*

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ABSTRACT

The origin of D. stramonium is not well known. But some groups said, it is distributed throughout the world. The others, it could be Asiatic. The aim of the present study was to analyze the bactericidal effect of Jimson weed leaf extract, D. stramonichtin. To extract this chemical, 200gram of dried leaf was extracted using methanol and chloroform solvents. To see and evaluate antibacterialcidal powers of jimson weed, the agar well diffusion assay was used against Gram-negative and Gram-positive bacteria. Penicillin and Dimethyl sulfoxides were used for positive and negative controls, respectively. Methanol extract showed the highest and chloroform extract showed moderate to good antibacterial activity. E.coli, Staphylococcus aureus, Klebsiella pneumonia, proteus vulgaris, Staphylococcus aureus and proteus vulgaris were the most susceptible bacteria. On the other hand, Bacillus subtilis, Shigella dyssentria, and Salmonella typhie were the resistant bacteria groups to the chloroform extracts of Jimson weed leaf, Bacillus subtilis, Shgella dussentria and Salmonella typhie were the most resistant bacteria methanol extracts of Jimson weed leaf extract.

KEYWORDS: Agar-Well Diffusion, Medicinal Plants & Solvent Extracts

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Original Article

INTRODUCTION

Plants have been a source of herbal remedies throughout the history of humankind. A number of medicinal plants have been used for years in daily life to cure various ailments caused by different types of microbes all over the world (Nimri et al., 1999; Saxena, 1997). The wide spread use of medicinal plants and healthcare preparation, such as those described in ancient texts like Bible, has been traced to the occurrence of natural products with medicinal value. Occurrence and survival of mankind is difficult without plant kingdom, because plants are the primary producers and play important role in survivaling the life forms on earth. Finding of new drugs from plants has been rise; because many of the microorganisms are posing series health related disorders. According to recent estimates by the billion people in the developing world depend on plants as source of medicine for different types of disease. Over 2,000 plants have medicinal properties and many plants are yet searched for their potentials. In addition to this, many of currently existing synthetic drugs cause various side effects. Hence, drug development from medicinal plant could be useful in meeting this demand for newer drugs with minimal side effects (Srivastava et al., 2000).The origin of *D. stramonium* is not well known. But some groups said it distributed throughout the world (Curtain, 1947). The others, it could be Asiatic, and some sources report a probable Central American origin, due to *Datura's* habitation of most temperate and subtropical parts of the world. "The native names applied by ethnic groups appear to be based upon the delirium effects produced by the plant on the nervous system" (Bye, Mata, and Pimentel 1991: 32-34). Throughout the ages, the Devil's Trumpet has been used for both intoxication and as medicine.

Jimson weed and other species of *Datura* are applicable for many purposes throughout the time. In Europe the plant was used for witch craft, in salves or ointments. In most of the European countries, the seeds were used to brew beer (Shaman Austral is Ethno botanicals). In Mexico, various tribes used *Toloache* in religious rituals. The weed was dried and smoked; the users were left on a high which consisted of hallucinations and total relaxation. Jimson weed was thought to cure those with deafness, soothe insomniacs, and release the heat of those with a fever. *D. stramonium* is thought to be one of two plants identified in 4,000-year-old rock paintings throughout the Pecos river region of Texas and northern Mexico, used by the Huichol indians along with peyote to commune with the spirit world (Boyd and Dering, 2000).Hernandez (! 959, 3:67) reported that the Aztecs applied a decoction of leaves to the body for fever or administered as a suppository. The fruit and leaves were considered important for pain in the chest. In northwestern New Spain, the Opata rubbed a leaf of Taguaro on the painful area for "spleen disease". They believed it also has matured tumors and abscesses (Nentuig [1764] 1977:62). An ointment of the ground seeds and suet is rubbed on boils, pimples, and swellings; the powdered leaves are applied to hemorrhoids; and hot baths containing the plant give relief to colds and diarrhea (Curtain, 1947).

OBJECTIVE

General Objective

Specific Objective

To determine, if jimson weed (*datura stramonium*) extract has antibacterial properties against different bacterial pathogens

MATERIALS AND METHODS

Plant Material and Extracts Preparation

The leaves of jimson weed (*datura stramonium*) were collected from Holeta rural forest. The collected leaves were washed thoroughly with running tap water and finally with sterile distilled water. The material dried thoroughly in shade place for 20-30day. Then, the leaves coarsely grinded and powdered with pestle and mortar, then allowed to sox let for successive extraction with methanol and chloroform, 200gs of plant material dipped in 1000ml methanol and chloroform in separate flask and write successively 3 day for 30 minutes in magnetic stirrer. Then, the plant exact was filtered with wattmans paper. The residue was discarded and the liquid extract was re filtered to remove other impurities. Then the liquid extracts were subjected to rotary evaporator to separated the chemical solvent from the extract and subsequently concentrated under reduced pressure (in vacuums at 40 c).

The dried plant extracted residues obtained were weighted and re dissolved 0.1% di methyl sulfoxide (DMSO) to get 100mg\ml concentration and filtration through a0.45 um membrane filter and stored in sterile bottles and freezed at 20 c.

Test Microorganisms

The microorganisms in the present study were klebsielapnemonia (MTCC B2405), Escherichia coli (MTCC B9637), Protus vulgaris (MTCC B0426), Bacillus subtilis (MTCC B2274), syaphylococcus aureus, shigella dyssenteriae, salmonella typhie, and streptococcus faecalis (MTCC B0459). Some cultures were purchased from microbial type culture collection (MTCC) and others are clinically isolated and the standard was obtained from molecular and microbial laboratory, which is store in freezer that microbes were used which stored in refrigerator in broth was refreshed for 4-6hrs at room temperature and inoculated in separate nutrient agar media and incubated for 24-48hrs, the cultured

microorganisms again sub cultured in Muller hinton agar media and incubated for 24hrs. Finally, the cultured media was stored in refrigerator for next experiment.

Active cultures were generated by inoculating a loop full of cultures in separate test tubs, which contain 10ml of distilled water and shacked thoroughly.

Determination of Antibacterial Activity

The methanol and chloroform extracts of jimson weed (*datura stramonium*) were screened for antibacterial activity by agar well diffusion method (Shagal MH, Modibbo UU, Liman AB, 2012; 2(1):16–19.) with corn borer of size 6.0 mm. All bacterial strains were stored in test tubes used for inoculation of the Muller Hinton agar plates.

An aliquot (15ul) of inoculums was introduced to molten and cooled at room temperature in Muller Hinton agar media and spread using sterile glass spreader/swap on to Muller Hinton solid agar media plats, so to achieve even growth by streak plate technique.

The plats were allowed to dry, and appropriate wells were made on respective agar plate by using cork borer. In agar well diffusion method, 0.05 ml of methanol extracts, chloroform and Dimethyl sulphoxide (DMSO) were placed using sterile forceps on the middle of Petri plate. Finally, incubate for a period of 24 to 48 hrs at 37oC overnight.

Inhibition Zone Measurement

Antibactericidal phenomena were evaluated by identifying inhibition zones (IZ) of bacterial growth surrounding the plant extracts. The inhibited zone was measured as the area around the first prepared hole, it was an area where no bacterial strains were grown as a result of liquid jimson weed extract; the required area was measured by a ruler. The entire antibacterial assay was carried out under suitable conditions. The required zone was measured and the data was recorded. Penicillin (5ug/disc) was used as positive control and DMSO as a negative control.

RESULTS AND DISCUSSIONS

The preliminary screening results of methanol and chloroform extracts were presented in Table 1. All the two extracts of level of jimson weed (datura stramonium) expressed antibacterial activity at least for bacterium. Methanol extract was most effective against the tested bacteria. The chloroform extract showed good to moderate antibacterial activity. The inhibition zone values were interpreted as sensitive (17mm), intermediate (12-15mm) and resistant (<12mm).

Table 1: The Preliminary Screening Results of Chloroform and Methanol Extract

Extract/Antibiotic	*Inhibition zone (mm)*							
	EC	*KP*	*PV*	*BS*	*SD*	*SF*	*SA*	*ST*
Chloroform	***14***	***13***	***27***	***2***	***4***	***11***	***16***	***0***
Methanol	***18***	***21***	***23***	***1***	***2***	***12***	***20***	***0***
Penicillin	***20***	***23***	***26***	***10***	***6***	***10***	***24***	***4***
DMSO	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***

EC; E.coli, KP; klebsiella pneumonia, PV; protus volgaris, BS; Bacillus subtilis, SD; Shigella dyssenteriae, SF; Streptococcus feacalis; SA; Staphylococcus aureus, ST; Salmonella typhie.

The photochemical in the components of the jimson weed (datura stramonium) have been established in previous studies and these include tannins, alkaloids, carbohydrates and phenols. Several studies have linked presence of these in

active compounds in plant materials to antimicrobial activity. In this study, a variety of human pathogenic bacteria were selected for the screening of antibacterial spectrum. Chloroform extract of jimson weed (datura stramonium) was found effective against *proteus vulgaris Klebsiella pneumonia, Staphylococcus arreus and E.coli,* while the same bacteria were highly sensitive to methanol extracts. *Escherichia coli, prteus vulgaris, Kleb Siella pneumonia, Staphylococcus aureus and Streptococcus faecalist* were fairly high degree of sensitivity (IZ -=17-27mm) to chloroform extracts, while the same bacteria showed to be intermediate sensitivity (IZ=13-27mm) to chloroform extracts. *Bacillus subtilis, Shiglla dysentria* and Salmonella typhie were most resistant (IZ=0-4mm) to chloroform extract, while the same bacteria showed also intermediate resistant (IZ=2-8) to methanol extract. Methanol extract of jimson weed (datura stramonium) showed fairly high degree of sensitivity (IZ=18-24mm) to all tested bacteria, except *Bacillus subtilis, Shigella dyssenteriae* and *Salmonella typhie,* which was less susceptible extracts. *Bacillus subtilis, Salmonella typhie and Shigella dyssenetriae* were the most resistant bacteria to chloroform and methanol extracts. Penicillin (5ug) was used as standard antibiotic reference (positive control) exhibited, except zone of inhibition values range from 15-24mm against most tested bacteria, except *Salmonella typhie, Streptococcus feacalis, Shigella dyssenteriae* and *Bacillus subtilis.*

These values were some what higher than values observed by methanol extract of jimson weed (datura stramonium) in most bacteria. This is because; the antibiotic is in pure state and has undergone some refining processes that have established it as standard antibiotic. The observed difference in efficacy may also be due to the fact that, the extracts were in a crude form and may contain some inert substances, which do not have any antibacterial activity.

In this study, most gram negative bacteria were the most susceptible bacteria to chloroform and methanol extracts of jimson weed (datura stramonium).

CONCLUSIONS AND RECOMMENDATIONS

Plants contain many biologically active compounds, which have potential for development as medicinal agents. Several studies have linked presence of theses bioactive compounds in plant materials to antimicrobial activity.

In this study, chloroform extract jimson weed (datura stramonium) inhibited the growth of proteus vulgaris, Klebsiella pneumonia, Staphylococcus aureus and E.coli moderately; on the other hand, the same bacteria were highly sensitive to methanol extracts. *Escherichia coli, proteus vulgaris Klebsiella pneumonia, Staphylococcus*_and *Streptococcus faecalis* were showing fairly high degree of sensitivity (IZ=17-24mm) to methanol extracts, while the same bacteria showed intermediate sensitivity (IZ=13-27mm) to chloroform extracts.

Bacillus subtilis, Shigella dysentria and *Salmonella typhie* were most resistant (IZ=0-4mm) to chloroform extract. Moreover, the same bacteria showed intermediate resistant (IZ=2-8) to methanol extract.

Methanol extract showed the highest and chlorofrom extract showed moderate to good antibacterial activity.

Jimson weed (datura stramonium) leaves possessed good antibacterial activity, confirming the great potential of bioactive compounds and are useful for rationalizing the use of this plant in primary health care. *In vivo* data may be helpful in determining the real potential usefulness. Although this study investigated the *in vitro* antibacterial activity, the results shows that the extracts from the leaves of this plant for the treatment of infectious diseases.

This investigation recommends that jimson weed leaf from the same area shall be subjected to better extraction methods by employing sufficient resource, time equipment and solvents like petroleum ether at 60-80^{o}C in sox let

apparatus followed by filtering and evaporation under reduced pressure using rotary vacuum evaporator. Thus, before *in vivo* studies can be done, it is the recommendation of this study that, future studies should carefully separate each components of the extract with appropriate chromatographic analysis technique, and test each ingredient in greater range of microorganisms and determe the real potential usefulness of this plant for treatment of infectious diseases *in vivo.*

REFERENCES

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2. *Bye, Mata, and Pimentel 1991: 32-34**.** Delirium effects produced by datura stramonium on the nervous system.*
3. *Curtain, 1947**.** An ointment of the ground seeds and suet is rubbed on boils, pimples, and swellings; the powdered leaves are applied to hemorrhoids; and hot baths containing the plant give relief to colds and diarrhea.*
4. *Curtain, 1947**,** the origin of D. stramonium is disputed.*
5. *Hernandez **(! 959, 3:67),** Reported that the Aztecs applied a decoction of datura stramonium leaves to the body for fever or administered as a suppository.*
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8. *Shagal MH, Modibbo UU, Liman AB, 2012; 2(1):16–19.) Methanol and chloroform extracts of jimson weed (datura stramonium) were screened for antibacterial activity by agar well diffusion method.*
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